

# HAZARD ASSESSMENT AND SELECTION OF PERSONAL PROTECTIVE EQUIPMENT FOR OPERATIONS IN CLANDESTINE LABS

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# The Problem

- National epidemic of clandestine methamphetamine “laboratories”
- Residences, motel rooms, condominiums, automobiles, dumpsters, etc.
- Fires, explosions, solvents, acid gases,  $\text{Ph}_3$ ,  $\text{NH}_3$ , metals
- Product precursors, residuals and final product
- Occult hazards from surface contamination
- An occupational and public health problem

# The Problem

- Not all clandestine laboratories are making methamphetamine:
  - Marijuana grow labs
  - Amphetamine – Speed, Crank
  - GHB – Date Rape, Scoop
  - LSD – Acid
  - MDMA – XTC, Ecstasy, Love Drug, Adam
  - Processing of other narcotics

# The Risks

- Personal Harm
  - To self
  - To family, neighbors
  - Public safety/first responders
  - Remediators, public health personnel
- Damage to property
- Damage to environment



# The Risks

- ▣ Data on methamphetamine labs collected from 16 states from Jan 2000, through June 2004 revealed:
  - Nearly 1,800 meth events
  - 10% of events involved fire or explosion
  - 31 percent of the events involved injuries, with police officers most often injured
  - 1,154 people underwent decontamination, 60 percent of which were emergency responders
    - Source: MMWR April 15, 2005 / 54(14);356-359

# Methods of Manufacture

## Red Phosphorus Method (Hot, Red P)

- ▣ Extract ephedrine-pseudoephedrine
- ▣ Add red phosphorus & iodine
- ▣ Let react for 8-72 hours
- ▣ Cool, filter red phosphorus
- ▣ Add sodium hydroxide
- ▣ Extract with solvent
- ▣ Salt out free base
- ▣ Purify as needed

# Methods of Manufacture

## Anhydrous Method (Birch, Cold, Nazi)

- ▣ Extract ephedrine-pseudoephedrine
- ▣ Add ammonia & lithium metal
- ▣ Let react for approx 3 hours
- ▣ Add sodium hydroxide
- ▣ Extract with solvent
- ▣ Salt out free base
- ▣ Purify as needed



# Methods of Manufacture

## One Pot or “Shake and Bake” Method

- ▣ Modification of the Birch or Anhydrous method
- ▣ Done in a single container, mix all the ingredients, agitate and vent cap
- ▣ Usually less than 1 gm produced
- ▣ In some localities, this is becoming THE way to make methamphetamine. May have a lot of separate batches
- ▣ Bring them all together to “salt out”

# Methods Summary

## Red Phosphorus

### Method

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Ephedrine

Solvents

HCl Generators

Acids & Alkalis

Iodine

Red Phosphorus

## Anhydrous Ammonia

### Method

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Ephedrine

Solvents

HCl Generators

Acids & Alkalis

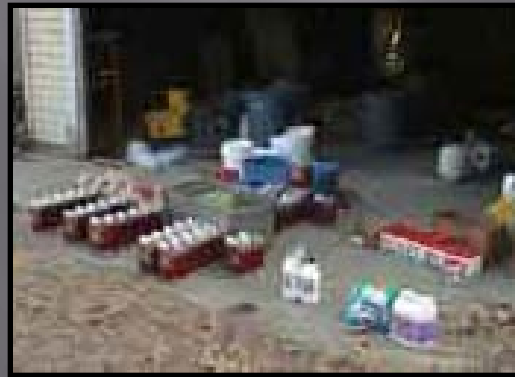
Reactive Metals

Anhydrous Ammonia

Key  
Differences

# What Status can Labs be Found

- ▣ Setup and Active
- ▣ Setup and Inactive
- ▣ Boxed or Stored
- ▣ Discarded



# What Status can Labs be Found

## Setup and Active

- ▣ Key indicators include:
  - Complete “Lab” setup
  - Active heat sources
  - Obvious chemical reactions
- ▣ Most dangerous situation!
  - Monitor for flammable/explosive atmosphere
  - Monitor for toxic gas and vapors





# What Status can Labs be Found

## Setup and Inactive

- ▣ Key indicators include:
  - Partial “Lab” setup
  - No active heat sources
  - No obvious chemical reactions
- ▣ Should be relatively stable
  - Monitor air quality
  - Splash hazard potential





# What Status can Labs be Found

## Boxed or Stored

- ▣ Key indicators include:
  - NO “Lab” setup
  - Materials stored or hidden
- ▣ Should be relatively stable
  - Should not need to take any actions
  - Chemical hazards may be present



# What Status can Labs be Found

## Discarded

- ▣ Key indicators include:
  - Can be found anywhere
  - All of the typical “precursors”
- ▣ Can be very unstable/dangerous!
  - Possible toxic or explosive reactions
  - Potential for splash hazards

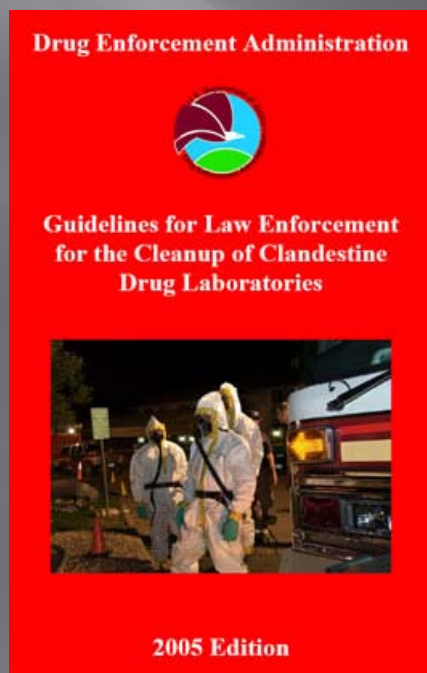


# Exposure Hazards

- Violent individuals
- Physical hazards-
  - Fire and/or explosions
  - Traps
  - Confined spaces
  - Slips, trips, falls
- Chemical hazards-
  - Volatile chemicals
  - Toxic chemicals
  - Corrosive chemicals
  - Reactive chemicals

# Existing Guidance

- DEA “Red Book”: Guidelines for Law Enforcement for the Cleanup of Clandestine Drug Laboratories



# Existing Guidance

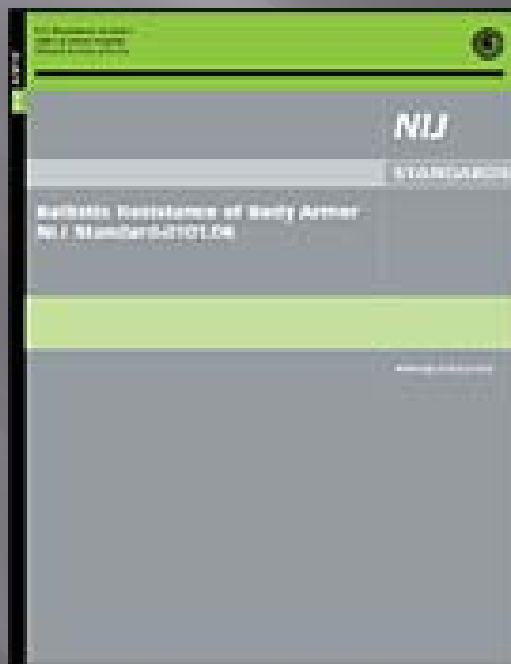
- EPA “Green Book”: Voluntary Guidelines for Methamphetamine Laboratory Cleanup





# Existing Guidance

- NIJ: CBRN Protective Ensemble Standard for Law Enforcement, NIJ Standard-0116.00



# DEA “Red Book”

- Determination of PPE requirement is made during initial “size-up” and site assessment
  - Includes tactical PPE as well as OSHA levels of protection
    - Level A
    - Level B
    - Level C
    - Level D
- Best practice is to change to next lower level as soon as conditions warrant

# DEA “Red Book”

- **Level A- Selected when the greatest level of skin, respiratory, and eye protection is required**
  - ▣ Positive pressure, full face-piece self-contained breathing apparatus (SCBA), or positive pressure supplied air respirator with escape SCBA, approved by the National Institute for Occupational Safety and Health (NIOSH)
  - ▣ Totally-encapsulating chemical-protective suit-flash protection may be needed
  - ▣ Gloves, outer, chemical-resistant
  - ▣ Gloves, inner, chemical-resistant
  - ▣ Boots, chemical-resistant, steel toe and shank
  - ▣ 2-way communication

# DEA “Red Book”

- **Level B-** The highest level of respiratory protection is necessary but a lesser level of skin protection is needed
  - ▣ Positive pressure, full-facepiece self-contained breathing apparatus (SCBA), or positive pressure supplied air respirator with escape SCBA (NIOSH approved)
  - ▣ Hooded chemical-resistant clothing (overalls and long-sleeved jacket; coveralls; one or two-piece chemical-splash suit; disposable chemical-resistant overalls)
  - ▣ Gloves, outer, chemical-resistant
  - ▣ Gloves, inner, chemical-resistant
  - ▣ Boots, outer, chemical-resistant steel toe and shank
  - ▣ 2-way communication

# DEA “Red Book”

- **Level C- The concentration(s) and type(s) of airborne substance(s) is known and the criteria for using air purifying respirators are met**
  - ▣ Full-face or half-mask, air purifying respirators (NIOSH approved)
  - ▣ Hooded chemical-resistant clothing (overalls; two-piece chemical-splash suit; disposable chemical-resistant overalls)
  - ▣ Gloves, outer, chemical-resistant
  - ▣ Gloves, inner, chemical-resistant
  - ▣ Boots (outer), chemical-resistant steel toe and shank
  - ▣ 2-way communication



# DEA “Red Book”

- **Level D-** The atmosphere contains no known hazard and work functions preclude splashes, immersion, or the potential for unexpected inhalation of or contact with hazardous levels of any chemicals.
  - Primarily a work uniform or coverall. It should not be worn on any site where respiratory or skin hazards exist. It provides no respiratory protection and minimal skin protection
  - Always wear eye protection, gloves, boots with steel-toe and shank

# EPA “Green Book”

- Determination of PPE requirement is made during initial site assessment and included in the site safety plan
  - Includes OSHA levels of protection
    - Level A
    - Level B
    - Level C
    - Level D
- Best practice is to change to next lower level as soon as conditions warrant

# CBRN Protective Ensemble Standard for Law Enforcement, NIJ Standard-0116.00

- ▣ 4 Law Enforcement Response Levels (LERs) based on mission requirements, expected mission duration, durability requirements of different operations and activities, and hazards in the CBRN threat environments

# CBRN Protective Ensemble Standard for Law Enforcement, NIJ Standard-0116.00

- ▣ **Law Enforcement Response Level-1 (LERL-1)**
  - Conditions unknown or known to be above Immediately Dangerous to Life and Health (IDLH)
  - Requires use of Self Contained Breathing Apparatus (SCBA)
  - Fully encapsulating
  - Requires Flame Resistance (FR) Protection

# CBRN Protective Ensemble Standard for Law Enforcement, NIJ Standard-0116.00

- ▣ **Law Enforcement Response Level–2 (LERL-2)**
  - Conditions unknown or known to be above IDLH
  - Requires use of SCBA
  - Dermal protection



# CBRN Protective Ensemble Standard for Law Enforcement, NIJ Standard-0116.00

- ▣ **Law Enforcement Response Level–3 (LERL–3)**
  - Known to be below IDLH
  - Requires use of Air Purifying Respirator (APR) or Powered Air Purifying Respirator (PAPR)
  - Dermal protection

# CBRN Protective Ensemble Standard for Law Enforcement, NIJ Standard-0116.00

- ▣ **Law Enforcement Response Level-4 (LERL-4)**
  - Known to be below IDLH
  - Requires use of APR or PAPR
  - Dermal protection

# Model Response

- ▣ Response for mobile laboratory at drugstore





# Model Response





# Model Response





# Model Response



# Summary

- ▣ When possible, conduct a site assessment to determine possible hazards
  - ▣ Type of laboratory: active, in-active, stored or dumped
  - ▣ If possible, prior to tactical operations notify the fire department, HAZMAT, EMS, contractors
  - ▣ Establish decontamination measures and RIT/back-up teams

# Summary

- ▣ Assume the worst, hope for the best
  - ▣ Wear highest level of protection that is practical for the situation
  - ▣ Be observant and monitor for physical and chemical hazards
  - ▣ Secure the scene and begin stabilization/mitigation

# Summary

- ▣ As conditions warrant, step down in level of PPE
  - ▣ Wearing of PPE is physically stressful
    - Increased heat stress
    - More physical exertion-heavy and bulky
  - ▣ Sensory impairment- poor vision/hearing
  - ▣ Increased risk of trips and falls



# For further information

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